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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/645,493	08/22/2003	Maria Ronay	YOR920030195US1	8744

30678 7590 12/02/2004

CONNOLLY BOVE LODGE & HUTZ LLP
SUITE 800
1990 M STREET NW
WASHINGTON, DC 20036-3425

EXAMINER

MULLER, BRYAN R

ART UNIT	PAPER NUMBER
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3723

DATE MAILED: 12/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

CS

Office Action Summary	Application No. 10/645,493	Applicant(s) RONAY, MARIA	
	Examiner Bryan R Muller	Art Unit 3723	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) 1-16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-36 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Claims 1-16 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on October 14, 2004.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
3. Claim 23 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
4. Claim 23 recites the limitation "the organic fluoropolymers " in line 1 of claim 23. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 17-19, 23, 28, 33-35 and 36 rejected under 35 U.S.C. 102(b) as being anticipated by Molnar (6,390,890).

6. In reference to claim 17, Molnar discloses a method of finishing semiconductor wafers comprising providing a liquid polishing slurry to the surface to be planarized (col. 17, lines 44-47) and contacting said surface with a polishing pad that comprises a polymeric matrix (col. 15, lines 3-18) and solid lubricant particles (col. 34, lines 37-39) in an amount sufficient to reduce friction between the pad and surface during planarizing (lubricant is defined as an agent that reduces friction between moving surfaces in col. 5, lines 15-16).

7. In reference to claim 18, Molnar discloses the method discussed supra and further discloses that a preferred lubricating agent may be a fluorocarbon resin selected from a group comprising PTFE, PFA, or FEP (col. 35, lines 15-24).

8. In reference to claim 19, Molnar discloses that the solid lubricant may be PTFE, but does not disclose a range for the coefficient of friction for the material. Extrinsic evidence is provided at web address www.plastomertech.com/properties.asp that the coefficient of friction of PTFE is 0.04, thus within the range claimed in claim 19.

9. In reference to claim 23, Molnar discloses that ultra high molecular weight polyethylene (UHMWPE) is a preferred ingredient (col. 25, lines 39-43) but does not disclose the actual molecular weight of such materials. Extrinsic evidence is provided in

U.S. Patent number 5,411,351 (Lasch) that UHMWPE has a molecular weight of at least 500,000 (col. 4, lines 31-33), thus within the range claimed in claim 23.

10. In reference to claim 28, Molnar discloses the method discussed supra and further discloses that the polymeric matrix is preferably made from an organic synthetic polymeric material selected from a group comprising polyurethanes, polyesters, polyamides, polycarbonates and polyvinylchloride (col. 15, lines 3-20).

11. In reference to claims 33 -35, Molnar discloses the method discussed supra and further discloses that the surface to be polished may be low-k dielectric materials including low-k porous materials, doped oxides and organic polymers (col. 18, lines 29-39). Although Molnar does not disclose that the doped oxides are CVD or that the organic polymers are of the spin on type, this portion of claim 35 appears to be product by process claims. Therefore, the doped oxides and organic polymers of Molnar's disclosure are relevant prior art for a 102(b) rejection because doped oxides and organic polymers would react in the same way no matter what process was used to produce them.

12. In reference to claim 36, Molnar discloses the method discussed supra and further discloses that the planarizing may be chemical mechanical polishing (CMP) (col. 1, line 12).

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Molnar (6,390,890) in view of Nishida (5,714,700).

15. Molnar discloses the method discussed supra but fails to disclose that the solid lubricant particles have a spherical, cylindrical or platelet shape. Nishida discloses a self-lubricating material wherein the lubricant particles are spherical or of platelet form, thus, teaching that solid lubricant particles may be spherical or of platelet form.

Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to make the solid lubricant particles spherical because the spherical shape would decrease surface area contacting the polishing pad or substrate and therefore, further decreasing friction, preventing scratching or damage to the substrate caused by additional heat caused by friction.

16. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Molnar (6,390,890) in view of Yamada (6,312,759).

17. Molnar discloses the method, as discussed supra, and that the solid lubricant may be PTFE, but fails to disclose that the size solid lubricant particles is about 0.05 to

about 18 microns or further that the size solid lubricant particles is about 0.05 to about 0.5 microns. Yamada discloses that the mean particle size of Polytetrafluoroethylene (PTFE) is 0.5 μm (microns) (col. 29, lines 19-20).

18. Claims 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Molnar (6,390,890) in view of Horie (4,555,250).

19. Molnar discloses the method discussed supra but fails to disclose that the amount of solid lubricant is about 0.5 to 30% by weight, or further disclose that the amount of solid lubricant is about 0.5 to 10% by weight, or even further disclose that the amount of solid lubricant is about 2 to 3% by weight. Horie discloses a grinding apparatus that uses a solid lubricant and that the amount of lubricant is 1 to 5% by weight. Therefore it would be obvious to one of ordinary skill in the art at the time the invention was made to provide the solid lubricant to the invention of Molnar in the amount of 1 to 5% by weight as a critical amount in order to minimize the amount of lubricant used, reducing cost and mess, and at the same time ensure sufficient lubrication to lower friction. This range of lubricant to be provided further limits the claimed ranges in claims 24 and 25 and overlaps the range claimed in claim 26, therefore making the range disclosed by Horie a relevant prior art rejection (see MPEP 2131.03 [R-2]).

20. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Molnar (6,390,890) in view of Murata (6,194,357).

21. Molnar discloses the method discussed supra but fails to disclose that the solid lubricant particles are treated with a surfactant in an amount sufficient to disperse the lubricant in a planarizing slurry upon being detached from the pad during planarization. Murata teaches that surfactant may be used in waterborne lubricant (CMP slurry is commonly known to comprise water to one of ordinary skill in the art) in order to disperse a solid lubricant in the water to homogeneity (col. 6, lines 33-38). Therefore it would be obvious to one of ordinary skill in the art at the time the invention was made to treat the solid lubricant disclosed by Molnar with a surfactant in order to produce a homogeneous slurry when the solid lubricant particles become detached from the pad during planarization. A homogeneous slurry would be advantageous because it would provide uniform polishing across the entire surface of the substrate and prevent scratching due to built up particles.

22. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Molnar (6,390,890) in view of Bajaj (6,045,435).

23. Molnar discloses the method discussed supra but fails to disclose that the polymeric matrix that makes up the polishing pad is micro porous. Bajaj discloses a CMP process and teaches that polyurethane pads typically comprise micro-porous urethane (col. 8, lines 10-13). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to use a micro-porous material, because the porous property would add to abrasiveness of the pad making it a more efficient

polishing surface and it is a commonly used material in the art and thus, would be relatively easy to acquire and it would be well known within the art how the material will react and how to maintain the pad.

24. Claims 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Molnar (6,390,890) in view of Cook (

25. In reference to claim 30, Molnar discloses the method discussed supra but fails to disclose that the polymeric matrix that makes up the polishing pad is non-porous. Cook discloses a polishing pad comprising a solid uniform polymer sheet having no intrinsic ability to absorb slurry particles (abstract, lines 1-4). One definition of the word "solid" is: Having no gaps or breaks; continuous;¹, thus defining the polishing pad of Cook as non-porous. Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to make the polymeric matrix non-porous to prevent the pad from absorb the polishing slurry and thereby reducing the total amount of slurry necessary to be used and further reducing operating cost by minimizing such slurry.

26. In reference to claim 31, Molnar discloses the method discussed supra but fails to disclose that the polishing pad surface contains macroscopic channels before use and microscopic texture during use to facilitate slurry transportation. Cook discloses a

¹ *The American Heritage® Dictionary of the English Language, Third Edition* copyright © 1992 by Houghton Mifflin Company. Electronic version licensed from INSO Corporation; further reproduction and distribution restricted in accordance with the Copyright Law of the United States. All rights reserved.

polishing pad that has macrotextures which act as channels for the unimpeded flow of slurry (col. 4, lines 39-42) and microtextures that also act as channels for the unimpeded flow of slurry (col. 5, lines 24-27), thus the polishing pad would have both macroscopic and microscopic channels before and during use. Cook further teaches that the unique combination of macroscopic and microscopic flow channels, present simultaneously, allows complete, unimpeded and uniform slurry flow to every portion of the pad surface (col. 5, lines 31-34). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to form macroscopic and microscopic flow channels in the surface of the polishing pad to allow complete, unimpeded and uniform slurry flow to every portion of the pad surface making the polishing more efficient at producing a uniform polished surface across the entire surface of the substrate.

27. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Molnar (6,390,890) in view of Chiddick (6,136,757).

28. Molnar discloses the method discussed supra but fails to disclose that the lubricant particles comprise a binding agent, coupling agent or adhesive promoter. Chiddick provides a solid lubricant and teaches that the addition of a binding agent is capable of binding a solid lubricants to metallic surfaces (such as the substrate) by dispersing the solid lubricant or holding the solid lubricant in a discontinuous phase matrix and that the binding agent has rigidity such that when the composition is placed

on the metal surface, it has some structure and will maintain its integrity (col. 4, lines 54-64) after being exposed to forces from other objects (such as polishing pad). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to provide the solid lubricant with a binding agent to assist with dispersing the lubricant across the surface of the substrate to provide a uniform polished surface and to maintain the integrity of the lubricant during use to extent the life of the lubricant composition, thus minimizing the amount of lubricant needed and overall operating cost of the polishing apparatus.

Conclusion

29. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Eppert (Pub US 2002/0002027 A1) provides polishing pads with micro and macroscopic channels, Robinson (6,325,702) provides a non-porous polishing pad with slurry distribution channels, Tanaka (6,305,847) and Kobayashi (JP 10228658 A) teaches of solid lubricant with spherical shaped particles, Ingerly (6,717,265) teaches of treatment of low-k materials with CMP processing, Hsu (6,656,018) provides a polishing pad comprising a polymeric matrix made of polyurethanes, polyacrylates, polyamides or polycarbonates, Ramanath (6,019,668) discloses a grinding wheel comprising a polymeric matrix and includes a solid lubricant

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and Karum (Pub US 2002/0025426 A1) teaches the use of a surfactant with solid lubricants to produce uniform compositions.

30. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bryan R Muller whose telephone number is (703)305-0487. The examiner can normally be reached on M-F.

31. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph J Hail III can be reached on (703)308-2687. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

32. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BRM BRM
11/24/2004



Joseph J. Hail, III
Supervisory Patent Examiner
Technology Center 3700